

Work Order ID 83698

83698

Page 1

May-30-12 7:56:41 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 4/23/12 Start Qty: 1.00

1

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr								
----------	--------------	--	--	--	--	--	--	--	--

D350-748-241	F	0.00							
100									
100	DOCUMENT CONTROL								
DC		0.00							
Document Control		Photocopy bluefile & type labels per PPPD350-748-201		CHG002					

110		0.00							
110	BENDING MACHINE - CROSSTUBES								
CNC Bend 2		0.00							
CNC Alpha 160 Bender		Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT							

120	QC15- Crosstube Dimensional Check	0.00							
120		0.00							
QC									
Quality Control									

Issue P/O to Met cor P/O: 16954 C812106104 12-5-10
Rec'd + inspect attached cofc to w/o

12-5-10
P/O#16954

Work Order ID 83698

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May-30-12 7:56:41 AM

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N900040100

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Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 4/23/12 Start Qty: 1.00

1

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

125

125

HandFXtube

Hand Finishing Crosstubes

Memo

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: _____

Start time: _____

Finish time: _____

0.00

0.00

0.00

0.00

127

QC5- Inspect part completeness to step on W/O

0.00

0.00

127

QC

Quality Control

Memo

5/7/05/20

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Item ID: D350-748-201

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130		0.00							
130	Crosstubes								
Crosstubes	Memo	0.00							
Crosstubes	1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-241								
	4-Remove all marks from tube within limits of D350-748-241								
	5- Apply a light coat of LPS3 on the interior of tube Batch: <u>140</u>								
140	QC6- Inspect dimensions to drawing	0.00							
140	Memo	0.00							
QC									
Quality Control									

MO/RM

12-5-23

5-25-30

12.05.10

QP

W/O:

WORK ORDER CHANGES

DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

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Revision ID:

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Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run

Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150 *150* Outsource3	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							CL 12/06/04 ①
Outsource process - Cad plate	Memo Issue P/O: <u>17084</u> Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possible Supplier: Southwest United Industries Ensure Certificate of Conformity is attached	0.00							
160 *160* Packaging	Receive & Inspect for Damage & Mat'l Certs	0.00							P/18 ①
Packaging	Memo Ensure certificate of conformity is attached	0.00							
170 *170* QC	QC5- Inspect part completeness to step on W/O	0.00							S. Shadis
Quality Control	Memo	0.00							

NDT

P/O: 17258

CL 12/06/19 x1

rec'd.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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NOTE: Date & initial all entries

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.13	161	LOAD TUBE TO 3000 ¹⁵ FOR 1 MINUTE REF D.S. EMAIL		GP 12/6/13	1	GP 12/6/13	
11.10.13	162	NDT TUBE					

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date				

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

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1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan:

Date: Tooling:

Date:

Run Start

NR1

QC:

Date: SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

180

180

SprayPaint

0.00

1

12-6-19

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside crosstube as per QSI 005 4.2
2-Paint Outside of Tube as per Dart QSI 005 4.2

190

QC14- Inspect Spray Paint

0.00

①

②

12-06-22

190

QC

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

200

200

Crosstubes

0.00

AJ

12-6-22

Crosstubes

Memo

0.00

Crosstubes

1-Install Ground wire Insert, then insert screw and washer
2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035.
3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Setup

Start

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Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2

Start Date: 23/04/2012 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00

210

QC

Quality Control

12/06/24

220

Pick Kit

0.00

220

Packaging

Memo

0.00

12/06/24

230

QC4- 100% Inspect kits for completeness

0.00

230

QC

Quality Control

12/06/25

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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Work Order ID 83698

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83698

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Item ID: D350-748-201

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop

NS2Start Date: 23/04/2012 Start Qty: 1.00 ***1***

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2Sequence ID/
Work Center ID

240

240

Packaging

Operation
Description

Packaging

Set Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

240

Packaging

0.00

Packaging

Memo

0.00

Identify and pack for shipping as per PPPD350-748-201

Location:

PPP Rev: B

12/06/25

250

250

QC

Quality Control

QC21- Final Inspection - Work Order Release

0.00

Memo

0.00

ML 12/06/25

MK
12-06-25

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Picklist Print

April-23-12 4:00:42 PM

Page 1

Work Order ID: 83698

83698

Parent Item: D350-748-201

D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 23/04/2012

Required Date: 07/05/2012

Comments:

IPP Rev: A New Issue 06-07-05 JLM
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F
 10.08.04 added QSI010 4.3 DD verf:EC

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-241TRN		Manufactured	No		879391	110	Each	1.0000	1	1		TW 12-5-9	

D350-748-241TRN

Crosstube Turning Detail

Location	Loc Qty	Loc Code
LG	1	
61314	0	
61315	0	
83287	1	

ALS4-1032-225

Purchased

No

200 Each 1,850.000

1 1

AI S4-1032-225

Insert

AS 12-6-22

Location	Loc Qty	Loc Code
ST281	1827	
108696	146	
110768	62	
118386	55	
118966	68	
121269	1496	①

ST282	Loc Qty	Loc Code
	23	
120410	10	
120451	13	

AN960JD10

NAS1149D0363J Purchased

No

200 Each 0.0000

1 1

AN960.JD10

Washer

**

AS 12-6-22

①

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Picklist Print

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Page 2

Work Order ID: 83698

83698

Parent Item: D350-748-201

D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 23/04/2012

Required Date: 07/05/2012

D2856-400

Manufactured No

200 f 353.5345 1.181 1.243158

**

D2856-400

Abrasion Strip

Al 12-6-22

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST403	216	
	216	1,2
ST409	137.5345	
63735	0.6696	
68076	0.3149	
71164	8.46	
79551	128.09	

1-cut as per dwg D2856

D3502-1

Manufactured No

200 Each 39.0000 2 2

**

D3502-1

Support

Al 12-6-22

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST051	39	①
73419	19	
74873	20	①

MS21920-20

Purchased No

200 Each 128.0000 2 2

**

MS21920-20

Clamp (per MIL-DTL-8783C)

Al 12-6-22

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG050	128	
116799	8	
120676	20	
121067	50	②
121274	50	

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Work Order ID: 83698

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

83698

D350-748-201

Start Date: 23/04/2012

Start Qty: 1.00

Required Date: 07/05/2012

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

186.0000

1

1

**

122027

①

Al 12-6-22

MS27039-1-10

Screw

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
-----------------	----------------	-----------------

GA	100	
----	-----	--

120449	100	
--------	-----	--

ST291	86	
-------	----	--

120120	86	
--------	----	--

AN4-41A

Purchased

No

220

Each

583.0000

8

8

**

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
-----------------	----------------	-----------------

360	181	
-----	-----	--

121185	181	
--------	-----	--

ST360	402	
-------	-----	--

115108	3	
--------	---	--

115705	7	
--------	---	--

117619	27	
--------	----	--

118451	50	
--------	----	--

118838	50	
--------	----	--

119328	100	
--------	-----	--

120423	150	
--------	-----	--

121205	15	
--------	----	--

AN4-6A

Purchased

No

220

Each

1,497.000

16

16

**

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
-----------------	----------------	-----------------

ST356	1497	
-------	------	--

119017	997	
--------	-----	--

121243	500	
--------	-----	--

W/O:		WORK ORDER CHANGES							
DATE	STEP	PROCEDURE CHANGE			By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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D350-748-201

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 23/04/2012

Start Qty: 1.00

Required Date: 07/05/2012

Required Qty: 1.00

AN5-32A

Purchased

No

220

Each

204.0000

4

**

AN5-32A

Bolt

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST339	204	
119328	39	
119862	50	
120423	75	
120910	30	
121415	10	

AN960JD416

NAS1149D0463J Purchased

No

220

Each

10.0000

32

32

**

AN960.JD416

Washer

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST351	10	
116289	10	

AN960JD516

NAS1149D0563J Purchased

No

220

Each

0.0000

8

8

**

AN960.JD516

Washer

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST351	10	
116289	10	

D3500-1

Manufactured

No

220

Each

99.0000

4

4

**

D3500-1

Saddle

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST423	14	
78595	14	
ST424	55	
73405	20	
73406	8	
76000	27	
ST425	30	
76940	30	

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
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Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

83698
D350-748-201

D3501-1

Manufactured

No

220

Each

360.0000

16

16

**

Start Date: 23/04/2012

Start Qty: 1.00

Required Date: 07/05/2012

Required Qty: 1.00

D3501-1

Bushing

7x
9x
50
B8544
B83253

Location	Loc Qty	Loc Code
ST051	360	
67757	4	
70682	82	
73391	6	
74866	207	
77033	61	

MS21042L4

Purchased

No

220

Each

6,008.000

24

**

MS21042L4

Nut

Location	Loc Qty	Loc Code
ST300	6008	
116188	5	
119017	4	
119075	999	
121011	2000	
121444	3000	

MS21042L5

Purchased

No

220

Each

1,351.000

4

**

MS21042L5

Nut

Location	Loc Qty	Loc Code
ST300	1351	
116105	5	
116548	43	
117611	30	
119109	1273	

W/O:		WORK ORDER CHANGES							
DATE	STEP	PROCEDURE CHANGE			By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)							
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector	
			Initial Chief Eng	Action Description Chief Eng	Sign & Date				

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	83698
Description: Crosstube High Aft (AS350/355)	Part Number:	D350-748-201
Inspection Dwg: D350-748-241	Rev: E	Page 1 of 1

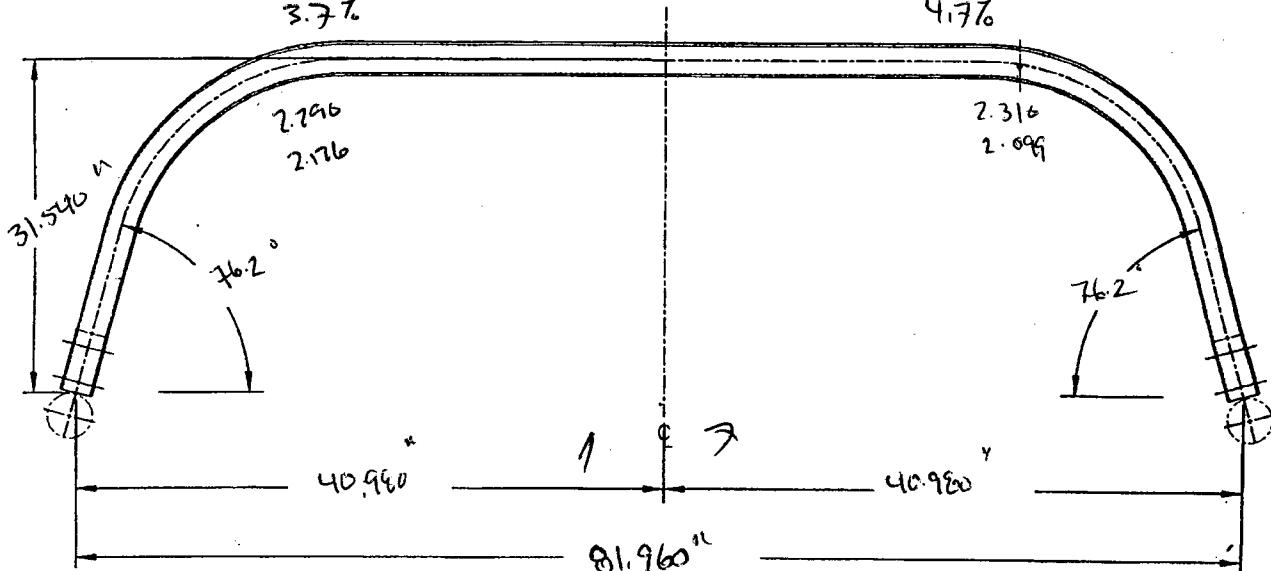
Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06

$0.164 \div 4.416$

3.7%

$0.211 \div 4.409$

4.7%



Comments
SIDE A = 3.7% crushin \ominus if passes
SIDE B = 4.7% crushin \ominus if passes
twist = 0.171
tube is 1/4" thick
OK if 12.05.73 / DS1041

QC15 Inspection	8/12/06-25
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

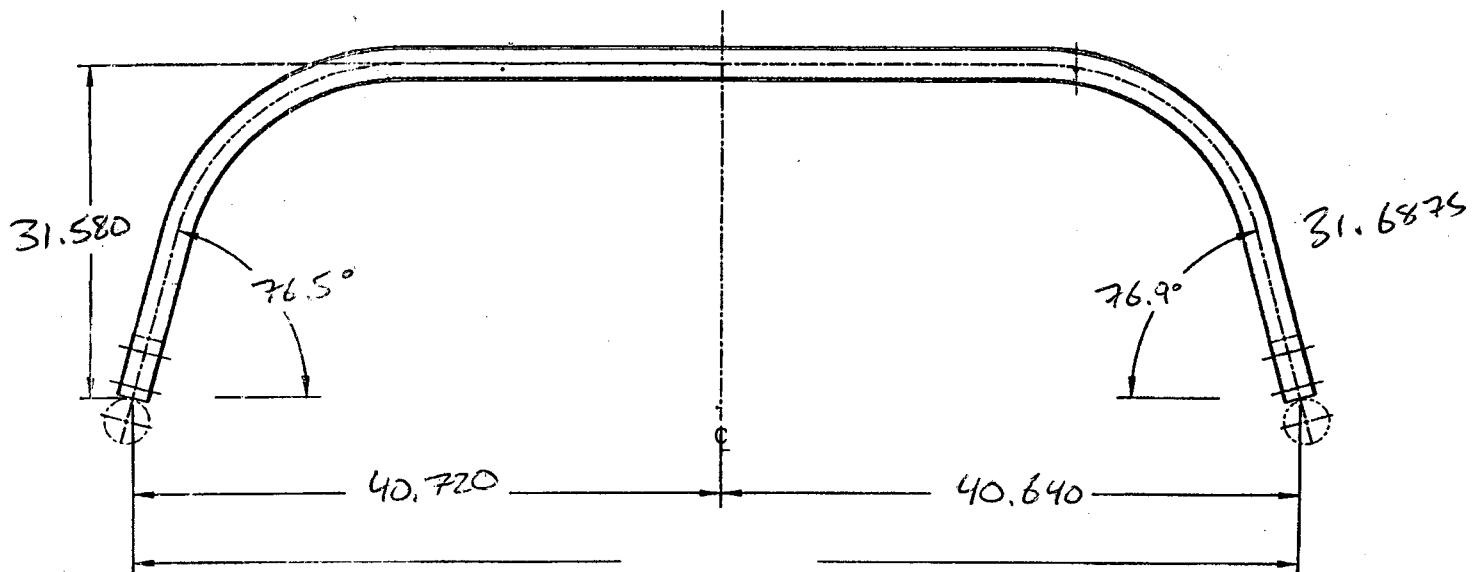
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	83698
Description: Crosstube High Aft (AS350/355)	Part Number:	D350-748-201
Inspection Dwg: D350-748-241	Rev: E	Page 1 of 1

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06

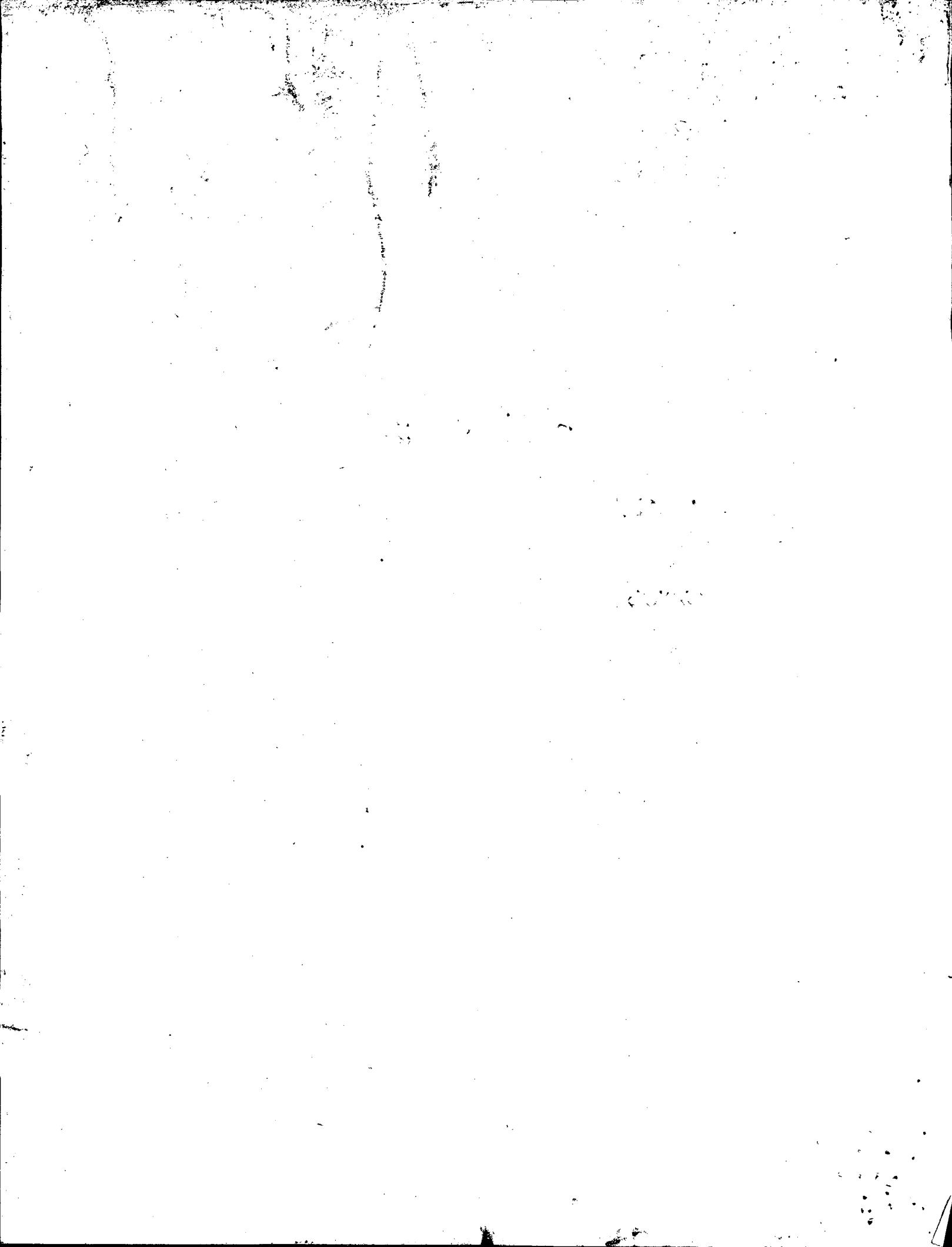


MO 12-5-17

Comments
Twist = 0
Acceptable (12-5-17) (PSI 09'2)

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	/



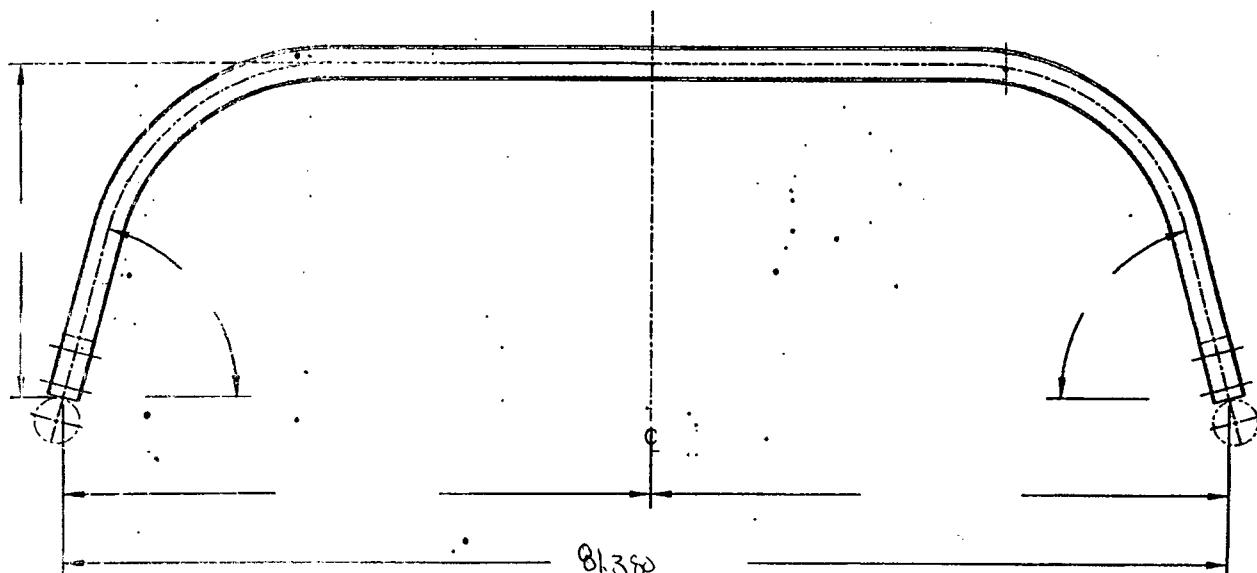
DART AEROSPACE LTD	Work Order:	
Description: Crosstube High Aft (AS350/355)	Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1

46.720

40.640

81.380

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Twist 0.188

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	JF

Item	Qty	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

83698 MCJ
12/04/24

RELEASED
2011-01-01

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
 FINISHED LENGTH = 122.700±0.06
 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
 CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
 PAINT OUTSIDE PER DART QSI 005 4.2
 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
 5) BEND SHARP EDGES: 0.005 TO 0.010 MAX.
 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
 PER DART QSI 044 6.4 (VIBRATING STYLUS)
 7) WEIGHT: 29.65 lbs
 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING
 LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
 BENDING.
 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
 BENDING IS 6% BASED ON O.D.
 11) HEAT TREAT TO MIN. 160 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
 VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
 CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
 OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
 NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
 CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
 MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
 CRACKING/CHIPPING/GROOVES.
 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
 NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
 CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES: UPDATE TO CURRENT STANDARDS. RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATING AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	9P	DART AEROSPACE LTD	
DRAWN	9P	HAWKESBURY, ONTARIO, CANADA	
CHECKED	15	DRAWING NO.	REV. F
MFG. APPR.	E	D350-748-241	SHEET 1 OF 4
APPROVED	MM	TITLE	SCALE
DE APPR.	MM	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD. THIS DOCUMENT IS THE PROPERTY OF DART AEROSPACE LTD. IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

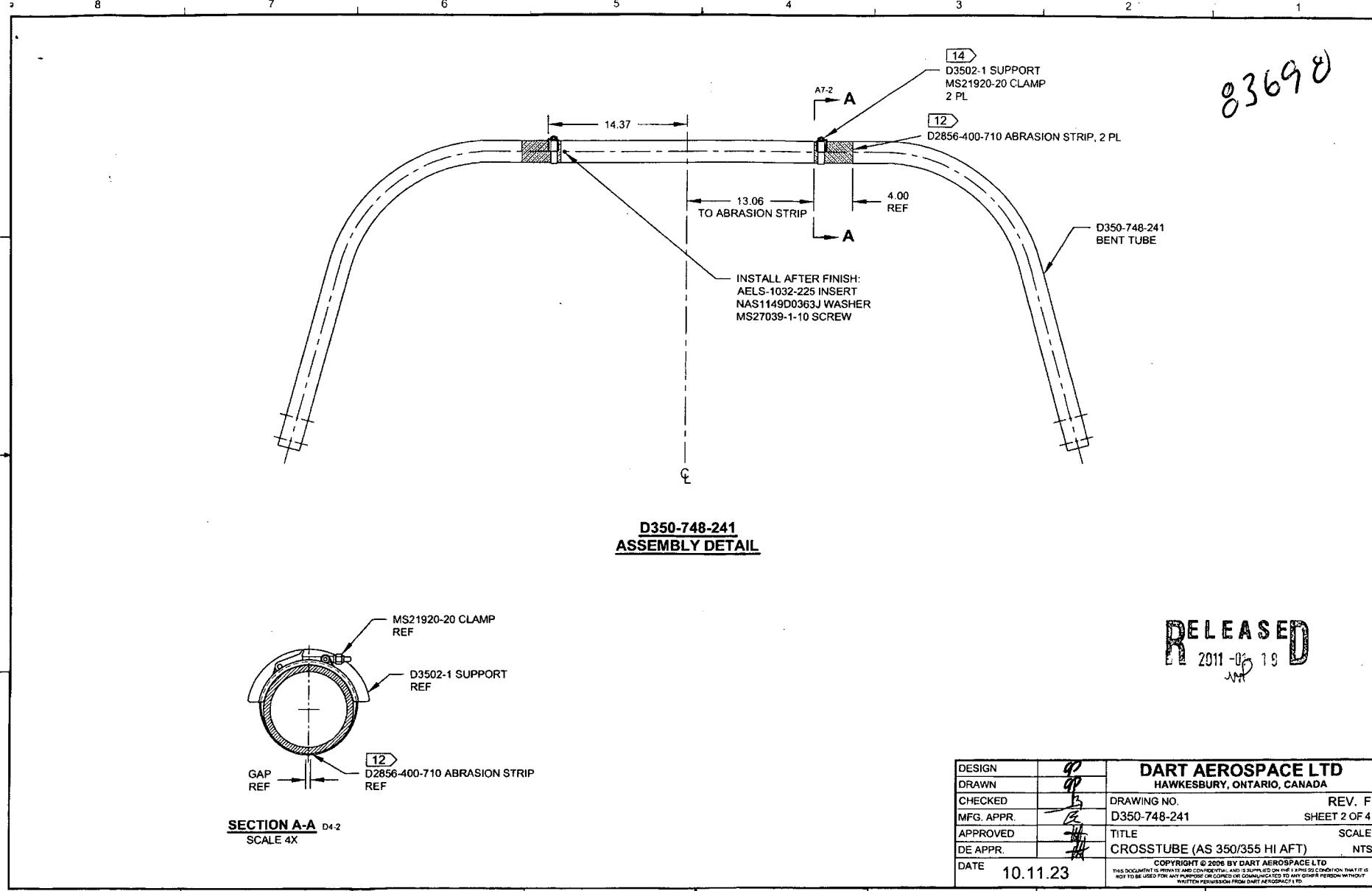
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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NOTE: Date & initial all entries

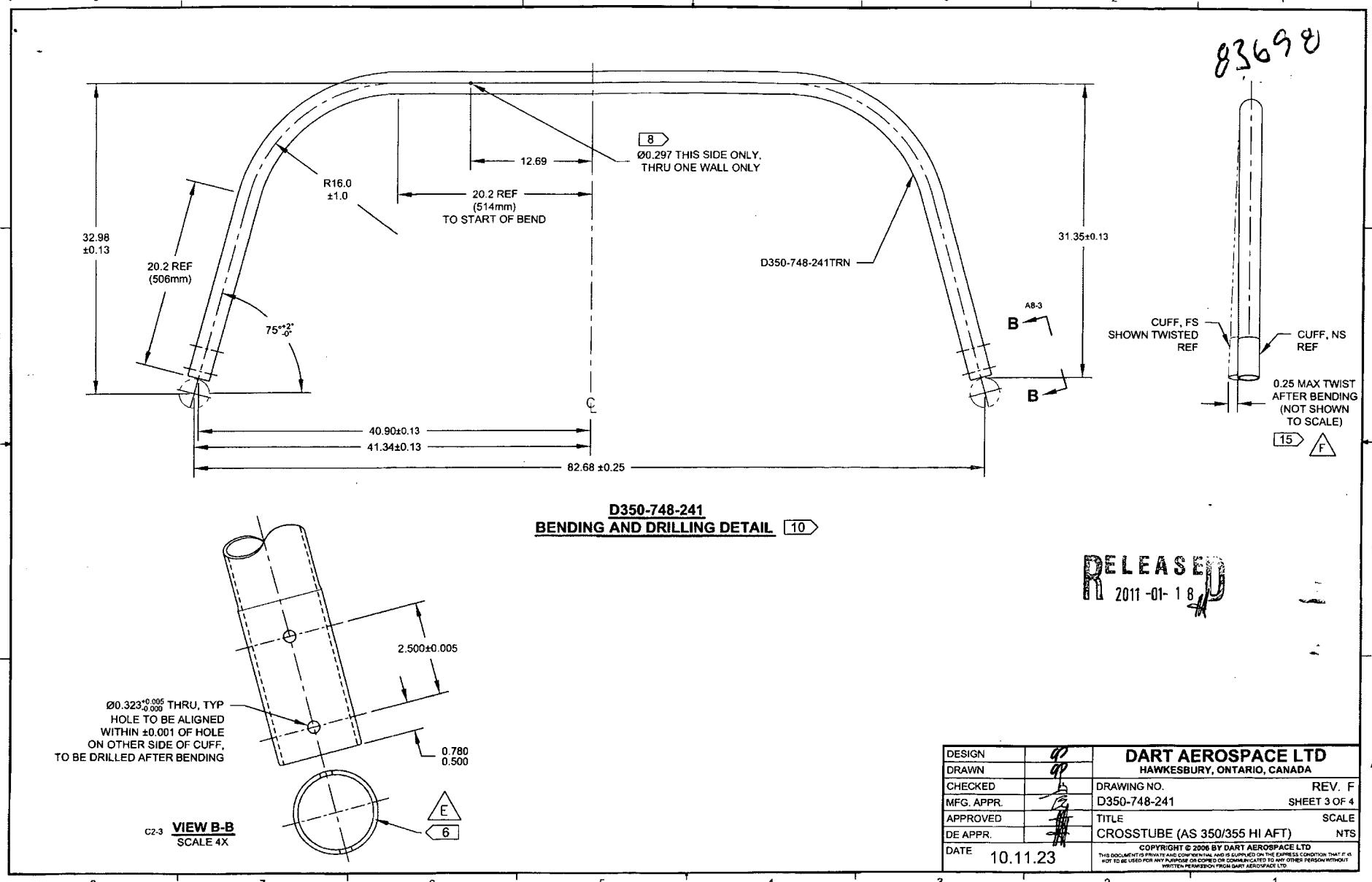


W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

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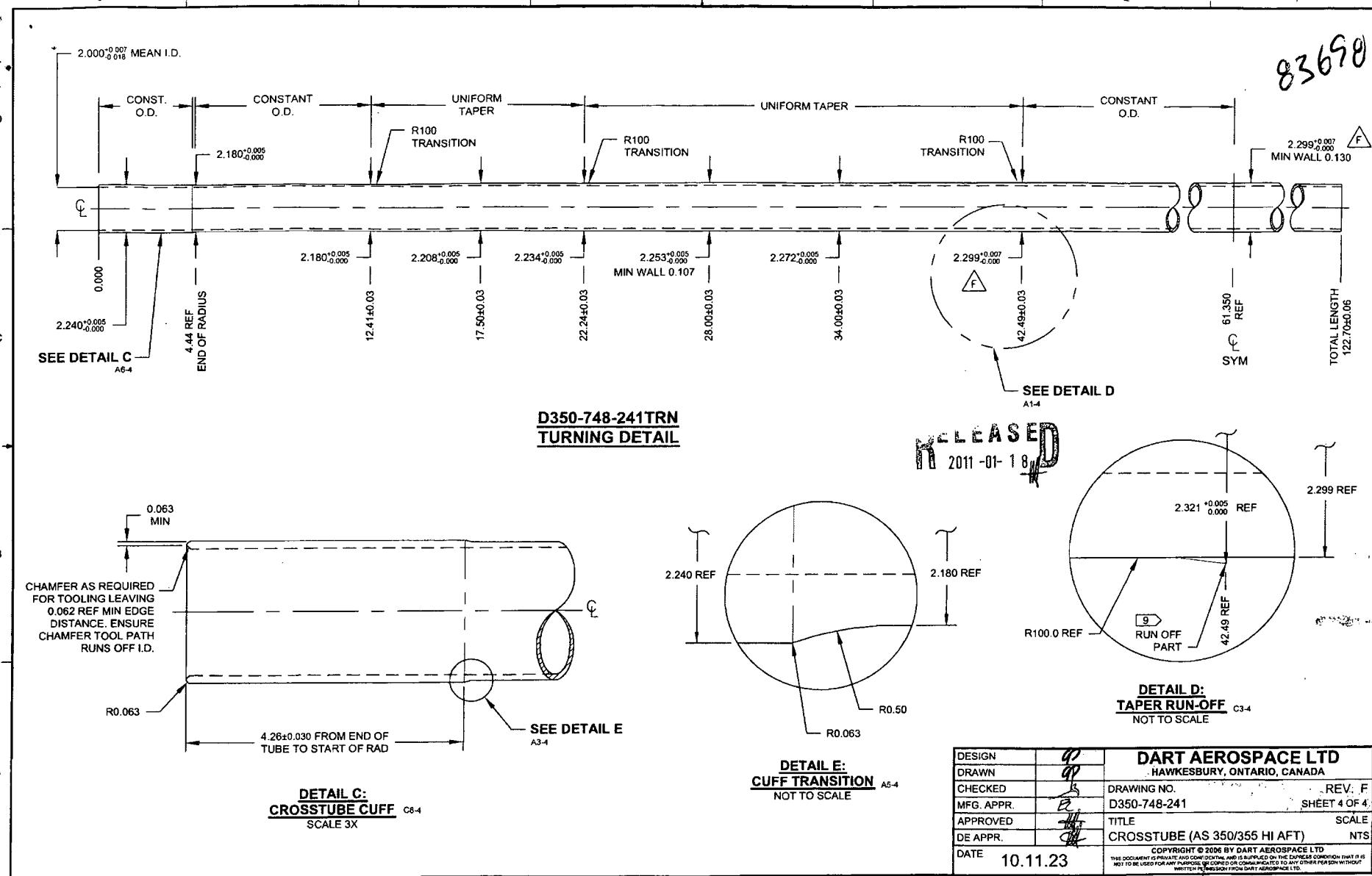
W/O:		WORK ORDER CHANGES							
DATE	STEP	PROCEDURE CHANGE			By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



DESIGN	99	DART AEROSPACE LTD
DRAWN	GP	HAWKESBURY, ONTARIO, CANADA
CHECKED	BS	REV. F
MFG. APPR.	PP	DRAWING NO.
APPROVED	MM	D350-748-241
DE APPR.	MM	SCALE
DATE	10.11.23	CROSSTUBE (AS 350/355 HI AFT) NTS

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NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT
WRITTEN PERMISSION FROM DART AEROSPACE LTD.

NOT TO SCALE

SHEET 4 OF 4

W/O:		WORK ORDER CHANGES							
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NOTE: Date & initial all entries

METCOR INC.
560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8
 Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détailé
Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175881	1

CLIENT / customer 215

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

1

COMMANDÉ DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
16942		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
 processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results
 Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
7	210	<p>D350-748-101 (1) CROSSTUBE</p> <p>(1) D350-748-101 CROSSTUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>CONTENANT: 1 PALETTE</p>

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1,00 CONT. INIT.	LAVAGE		si nécessaire							

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 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

1

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifié Specified Soak Temp	Atmosphere	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
2,00 PREPARATION	COMPTAGE									
3,00 STRESS RELIEF	650	2 hrs 30 minutes	air			701				
4,00 FINAL INSPECTION							05-11-2012			05-11-2012

COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

APPROUVÉ par / Approved by:

John Adams



DATE: 2012-05-11

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client./We certify that all the information on this report is exact and in accordance with the order requirements.

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Jun-12-2012

CONSIGNMENT TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114963
INVOICE #: 60875

**CONTRACT OR
PURCHASE ORDER #** PO17084

DESCRIPTION: CROSSTUBE **QTY** 1

P/N # D350-748-201

S/N # 83698

STRESS RELIEVE HEAT CHART # 12-546. MPI-IAW ASTM E-1444.
CADMIUM PLATE IAW AMS-QQP-416C TYPE 2 YELLOW CLASS.
BAKE HEAT CHART # 12-573. MPI IAW ASTM-E1444.

81766/8

CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.

Approved Inspector:

CAI
08



LIQUID PENETRANT TEST REPORT

P- 12188

NT
ENTIC
ADDRESS

DAT Aerospace
MATT/LINDA
1270 ABERDEEN ST.
HAWKESBURY, ONT

DATE
ACUREN JOB NO.
PO/WO NO.
WORK LOCATION
ACCEPTANCE STD

June 19/2012 TIME AM PM
100-12 20.265

PROJECT
ITEM(S) EXAMINED

F.P.I. on cross tubes
(6) Pcs SEE RESULTS

17084 —
SAWE
ASTM 1417/ESI 03E REV./DATE 2005

JOB DESCRIPTION PROCEDURE NO. LT002 REV./DATE 2008 TECHNIQUE NO. LT TECH 2008

PART NO. SEE RESULTS
SCOPE A WET FLUORESCENT LIQUID PENETRANT EXAMINATION
AS COMPLETED 100% ON EXTERNAL SURFACE

TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
FLUID	MAGNAFLUX		BLACK LIGHTS/N 16459	OUTPUT > 1000 μ W/cm ²	AMBIENT < 2 fc
PEELER	ZL67	MINIMUM DWELL TIME 45 ¹⁰	MIN.	FLASHLIGHT	OUTPUT > 100 fc @ SUPF.
PEELER REMOVER	H ₂ O	MINIMUM DRY TIME >10	MIN.	TROUBLELIGHT	
DEVE. TIME	SKD 52	MINIMUM DWELL TIME 10	MIN.	LIGHT METER S/N 1098866	CAL DUE DATE
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY	July 19/2012	

TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED
SURFACE TEMPERATURE	<input type="checkbox"/> < -4°C/20°F	<input type="checkbox"/> -4°C/20°F TO 10°C/50°F	<input type="checkbox"/> 10°C/50°F TO 52°C/125°F	<input checked="" type="checkbox"/> CLEAN BARE METAL
	<input checked="" type="checkbox"/> METRIC	<input type="checkbox"/> IMPERIAL	<input type="checkbox"/> > 52°C/125°F	

RESULTS-

W.O. #s - CROSS TUBES.

1 - " " 83701
1 - " " 83699
1 - " " 83698
1 - " " 81517
1 - " " 81519
1 - " " 84380

12-06-19

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is agreed that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, express or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE

Matthew Murdoch *Matthew Murdoch*
PRINT SIGNATURE

DTR # E 63501

TECHNICIAN (SIGNATURE):

Mike Lethbridge

NAME (PRINT):

1ST TECHNICIAN
CGSB LEVEL SNT LEVEL
CGSB REG. NO. 10066

2ND TECHNICIAN
CGSB LEVEL SNT LEVEL
CGSB REG. NO.

REPORT
REVIEWED BY:

NAME

INIT

CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY